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Announcement of the

Summer School of Biology

1927

July 5—August 12

Ithaca, New York
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THE CALENDAR

SUMMER SESSION OF 1927

THE FIRST TEN DAYS

July 5, Tuesday, 8 A. M.-5 P. M.	Registration, <i>Room A, Goldwin Smith Hall.</i>
July 6, Wednesday.....	Instruction begins at the time and place announced for each course. Registration is continued in the Registrar's Office, <i>Morrill Hall.</i>
July 6, Wednesday evening.....	Organ Recital, <i>Sage Chapel.</i>
July 7, Thursday evening.....	Piano Recital.
July 8, Friday, until 4 P. M.....	Last day for payment of fees at the Treasurer's office, <i>1 Morrill Hall.</i>
July 9, Saturday.....	Five-hour classes meet as usual on this Saturday, as also on Saturday, July 16.
July 10, Sunday, 11 A. M.....	Public Worship and Sermon in <i>Sage Chapel.</i>
July 10, Sunday evening.....	Organ Recital, <i>Bailey Hall.</i>
July 11, Monday evening.....	Lecture Course.

THE REGULAR WEEKLY SCHEDULE

Sunday, 11 A. M.	Public Worship and Sermon, <i>Sage Chapel.</i> (Beginning July 10.)
Sunday evening,	Organ Recital, <i>Bailey Hall.</i> (Beginning July 10.)
Monday evening,	Lecture Course, <i>Barnes Hall.</i> (Beginning July 11.)
Tuesday evening,	Organ Recital, <i>Sage Chapel.</i> (Beginning July 13.)
Wednesday evening,	Departmental Lectures and Conferences. (Beginning July 14.)
Thursday evening,	Piano Recital. (Beginning July 7.)
Friday evening,	Plays by Summer Theater Company. (Beginning July 8.)
Saturday evening,	Plays by Summer Theater Company. (Beginning July 9.)

CONCERTS

Friday evening: concerts. *Bailey Hall.* Artists to be announced.

THE LAST DAY

August 12, Friday.....Summer Session ends.

THE WEEKLY CALENDAR

The WEEKLY CALENDAR of the University carries announcements of all public exercises held in connection with the Summer Session. It is posted on the bulletin boards.

SUMMER SCHOOL OF BIOLOGY

Under the auspices of the Summer Session of the New York State College of Agriculture and of the Summer Session of Cornell University.

STAFF OF INSTRUCTION

PAUL RUFUS BURKHOLDER, A.B., Instructor in Botany.
OTIS FREEMAN CURTIS, Ph.D., Professor of Botany (Physiology).
ARTHUR JOHNSON EAMES, Ph.D., Professor of Botany (Anatomy).
HARRY MORTON FITZPATRICK, Ph.D., Professor of Plant Pathology (Mycology).
ALLEN CAMERON FRASER, Ph.D., Assistant Professor of Plant Breeding.
WILLIAM ARTHUR HAGAN, D.V.M., Professor of Pathology and Bacteriology.
OSKAR AUGUSTUS JOHANSEN, Ph.D., Professor of Entomology.
BENJAMIN FREEMAN KINGSBURY, Ph.D., Professor of Histology and Embryology.
ROBERT MATHESON, Ph.D., Professor of Entomology.
WALTER CONRAD MUENSCHER, Ph.D., Assistant Professor of Botany.
LOREN C. PETRY, Ph.D., Professor of Botany.
HUGH DANIEL REED, Ph.D., Professor of Zoology.
WILLIAM MITCHELL ROGERS, B.S., Instructor in Histology and Embryology.
WILLIAM CHARLES SENNING, A.B., Instructor in Zoology.
LESTER WHYLAND SHARP, Ph.D., Professor of Botany (Cytology).
JAMES WHAPLES SINDEN, A.B., Instructor in Plant Pathology.
DONALD STUART WELCH, Ph.D., Assistant Professor of Plant Pathology.
BENJAMIN PERCY YOUNG, Ph.D., Assistant Professor of Zoology.

GENERAL PLANS AND AIMS

The Summer School of Biology was organized to provide instruction of the highest grade in zoology, botany, and allied subjects. All the regular facilities of the University are at the disposal of the student, and as far as possible the staff has been restricted to teachers of professorial rank in the University. The courses are for the most part those given during the regular academic year condensed into a period of six weeks, but not abridged. The work is particularly planned to meet the needs of teachers and graduate students who wish to know, in addition to the subject matter, something of the methods and sources in teaching; but undergraduates also, if sufficiently prepared, will find the courses adapted to their needs. Intensive rather than extensive work is necessarily expected of each student, as the courses are comprehensive. These courses lead toward advanced degrees, and special attention is given to graduate students pursuing research. Students interested in graduate study should, if possible, consult by letter with the professor concerned, before coming to Ithaca.

ADVANTAGES OF LOCATION

The intensive interest in Biology at Cornell University over a period of years has resulted in a wealth of laboratory material. Very extensive and in some cases unique collections of both plants and animals and a very complete working library, are available to students prepared to make use of them. Ithaca is located in the Finger Lakes region of Central New York, noted not only for its picturesque beauty, but for its richness in biological material of both plants and animals. In this respect the University is perhaps not excelled by any other institution in the country. The collecting grounds are for the most part adjacent to the campus, and can be very readily visited. Within easy reach of the laboratories are freshwater marshes and lakes, salt springs, marl springs, marl bogs, peat bogs, extensive ravines with numerous waterfalls, and upland woods or fields overlying either calcareous or noncalcareous sandy or heavy soils. The county shows a considerable variation in elevation, thus giving samples of several life zones. It is therefore possible to use as illustrative material those inland organisms which may be obtained most readily by teachers throughout the country for use in their own classes.

GENERAL INFORMATION

CONDUCT AND SCHOLARSHIP

The Summer Session is conducted under the same general regulations concerning conduct and scholarship as apply during the academic year. For this reason students are requested to familiarize themselves with dormitory and other rules, and to abide by them. The officers of the University also reserve the right to cancel the registration of any student at any time for neglect of scholastic duties. The rules governing student conduct are:

"A student is expected to show both within and without the University unfailing respect for order, morality, personal honor, and the rights of others. The authority to administer this rule and to impose penalties for its violation is vested in the University Committee on Student Affairs. The rule is construed as applicable at all times, in all places, to all students of the University. A student may at any time be removed from the University, if in the opinion of the Committee on Student Affairs, his presence is not conducive to the University's best interests."

ADMISSION

There are no examinations for admission to the Summer Session. Each person must, however, satisfy the instructor in charge of every course he intends to take, unless it be elementary, that he is qualified to pursue the work.

Admission to the classrooms during the Summer Session is restricted to students duly registered for the session. A student thus duly registered may occasionally visit any class; but if he wishes to attend regularly without credit he must secure special permission from the Chairman of the Summer Session. Such permission will be granted only when the student can show a serious purpose in such attendance.

If a student entering the Summer Session wishes his work to count toward a degree, there are certain regulations that he must comply with, and he will find them set forth below.

REGISTRATION

All students of the school are required to register with the Registrar of the University. The hours and places of registration are given in the Calendar of the session, on page 2. Students may register on Tuesday, July 5, between 8 A. M. and 5 P. M., or on the day of their arrival, if they reach Ithaca on July 6 or later. They are urged to register on July 5. Registration before that day is not required, and it is not necessary to apply in advance for registration blanks.

Beginning on Wednesday, July 6, the Registrar's office in Morrill Hall will be open from 9 A. M. till 4 P. M. every week day except Saturday, when it will be closed at noon.

Students who wish to obtain credit for graduate work to be done during the Summer Session must register not only with the Registrar but also with the Dean of the Graduate School, at his office in Room 22, Morrill Hall.

TUITION

The charge for tuition in the Summer School of Biology is fifty dollars.

The tuition fee is payable in full, on the first registration day or within the next five days, at the office of the Treasurer, Room 1, Morrill Hall.

Any student who fails to pay his tuition charges, other fees, and other indebtedness to the University, or who, if entitled to free tuition, fails to claim it at the Treasurer's office and to pay his fees and other indebtedness, within the prescribed period of grace, is thereby dropped from the University unless the Treasurer has granted him an extension of time to complete payment. The Treasurer is permitted to grant such an extension when, in his judgment, the circumstances of a particular case warrant his doing so. For any such extension the student is assessed a fee of \$5 for the first week and \$2 additional for each subsequent week in which the whole or any part of the debt remains unpaid, but the assessment in any case is not more than \$15. The assessment may be waived in any instance for reasons satisfactory to the Comptroller and the Registrar, when such reasons are set forth in a written statement.

If a student withdraws from the Summer Session, the Treasurer may refund a part of the tuition fee or cancel a part of the obligation that the student has incurred for tuition, provided the reason for the withdrawal be stated in writing and be satisfactory to the Comptroller and the Registrar. In such a case the student is required to pay twenty-five per cent of the term's tuition for each week or fraction of a week between the first registration day and the date of his certificate of withdrawal.

Students registering at any time during the last four weeks of the Summer Session are required to pay for the remainder of the term at the rate of twenty-five per cent of the term's tuition for each week or fraction of a week between the date of registration and the last examination day of the term.

Any tuition fee or other fee may be changed by the Trustees to take effect at any time without previous notice.

LABORATORY FEES

A fee is charged, as stated under each course, to cover the use of materials and laboratory equipment. In some courses a deposit is required to cover breakage and apparatus checked out to students during the period of the session.

OTHER FEES

Library. A person who obtains the privilege of taking books from the University Library for home use is required to make a deposit of five dollars, which will be refunded upon the return of all books taken out.

A fee of two dollars is charged for the privileges of Willard Straight Hall. See page 12.

UNDERGRADUATE ACADEMIC CREDIT

On the completion of any course offered in the Summer School of Biology the student may receive credit toward a degree for the number of hours indicated under each course. Requirements for the baccalaureate degree in each college may be learned on application.

GRADUATE WORK IN THE SUMMER

Most of the work offered in the Summer School of Biology leads directly toward advanced degrees.

ADMISSION

Graduate students, if not candidates for advanced degrees, may take any courses desired with no further formalities than those indicated above.

A graduate of any college whose requirements for a first degree are substantially equivalent to those for the first degree at Cornell may be admitted to resident study in the Graduate School. He may at once enter upon candidacy for an advanced degree if he is able to show that he has had adequate preliminary training in the subjects in which he proposes to work. Work leading toward the degrees of A.M., M.S., and Ph.D. is offered.

Students wishing to become candidates for an advanced degree and to study in the Summer School of Biology are advised to write to the professor whose work they expect to take or confer with him personally before the opening of the School. They should also write to the Dean of the Graduate School, asking for a blank form of application for admission to the Graduate School. Delay may be avoided by making these arrangements before coming to Ithaca. In this way, moreover, it may be possible to secure the advice and guidance of professors in fields of study of which no specific mention is made in the announcements.

REGISTRATION

Before beginning his work a graduate student must register with the Registrar and with the Dean of the Graduate School. The latest date for such registration in 1927 is July 8. Residence credit cannot be given unless registration and formal candidacy for a degree under a special committee are arranged before the above date. No period of less than six weeks can be counted toward residence for a degree.

FEES

Graduate students not candidates for a degree are subject to the general tuition requirements of the University Summer Session as set forth on page 6. Students of the Summer School of Biology who have been admitted to candidacy for an advanced degree are required to pay the regular tuition fee, fifty dollars, but are exempt from tuition and administration fees in the Graduate School. On registering for the first time as candidates, students who have not previously matriculated in Cornell University will be given matricula-

tion without payment of the usual fee on presenting a certificate that they have paid the tuition charges of the current Summer Session.

All graduate students pay such laboratory fees as are prescribed under the individual courses that they may pursue.

THE MASTER'S DEGREE

The candidate wishing to matriculate for the Master's degree must select an acceptable major subject and one related minor subject and obtain the signatures of the professors representing those fields of study. The professors with whom he thus works constitute his special committee. While the candidate is expected to assume the initiative and responsibility for his studies, he is expected to follow the general advice of this committee, who will examine him on the completion of his work, and recommend him for the degree.

Many courses offered in the Summer School lead toward this degree. The student with the aid and approval of his graduate committee plans a program of study leading toward his degree. After a minimum residence of four summer sessions, the completion of his program in a scholarly manner, and the completion of a thesis, he will appear before his committee for a final oral, or oral and written, examination on the field covered by his program and on his thesis. On the satisfactory completion of his program and thesis he will be recommended for the Master's degree to the Faculty of the Graduate School.

It should be noted that in general not courses and hours but final scholarship and achievement determine the eligibility of a student for the degree. Graduate work to be considered acceptable for a degree must be of an advanced character.

Although four summer sessions are said above to be acceptable as a minimum requirement of residence, this time is really less than is required during the academic year, as four summer sessions make a total of twenty-four weeks whereas the regular year is about thirty weeks in length. For this reason the student may be expected to complete some work at Ithaca or *in absentia*, under the direction of his committee, either during the academic year or in a later summer session. Occasionally a fifth summer session is necessary in order to complete the thesis, or to take courses which, owing to conflict or other causes, could not previously be taken.

THE DOCTOR'S DEGREE

Candidates will find it necessary to pursue the greater part of the work for this degree during the regular academic year. During the Summer Session, however, many courses are given which are necessary as background or preparation for further work, and on recommendation of the student's special committee he will receive residence credit for attendance at the summer session. It is frequently possible to arrange for the supervision of research during the summer, either over the period of six weeks or preferably over a longer period. Summer work toward the Doctor's degree should be arranged for in advance.

CERTIFICATES FOR WORK DONE

Students of the Summer Session who are not matriculated in the University may receive certificates of attendance and of work satisfactorily performed. Application for them must be made before August 15, and the applicant must leave at the office of the Registrar a large-sized envelope stamped and directed to his home address. The certificate will then be forwarded by mail. The regulations of each department for the granting of a certificate must be met.

RESIDENTIAL HALLS: ROOMS: BOARD

FOR WOMEN

The University has three residential halls for women in which rooms and board may be obtained during the Summer Session by registered students only. They are:

Sage College, which accommodates 175 persons. Here the charge for room, table board, and a specified amount of laundry, for the session is from \$72 to \$87, according to the size and location of the room.

Prudence Risley Hall, which accommodates 184 persons. Here the charge for room, table board, and a specified amount of laundry, for the session, is from \$78 to \$87, according to the size and location of the room.

Cascadilla Hall. In this building, which accommodates about 160 persons, a furnished room may be had for the session at a cost of \$23 to \$29. The charge includes a specified amount of laundry. This building has shower baths and not tubs. On the ground floor the University conducts a cafeteria restaurant where meals can be obtained at reasonable rates.

Besides these halls, there are certain *approved houses* which are occupied exclusively by women and which, like the halls, are under the direct supervision of the Dean of Women.

Undergraduate women students of Cornell and other colleges and other women students under twenty-one years of age are expected to live in the residential halls or the approved houses. Any woman student should consult the Dean of Women before engaging a room.

In Sage College and Prudence Risley Hall, the charge for room and board includes lodging Monday night, July 4 (not earlier), breakfast Thursday, July 5, and all meals to and including breakfast Sunday, August 14.

Members of the Summer Session who lodge outside Sage College and Prudence Risley Hall may obtain table board at either of those halls for \$9 a week.

Each of the residential halls is in charge of a warden, who is glad to know the students, to advise them in illness or other emergency, and to give them whatever information they wish about the Univer-

sity or the town. It is understood that persons living in the halls will conform to the house regulations made for the convenience and comfort of all.

Application for rooms in any of the residential halls or approved houses for women should be made to the Manager of Residential Halls, Morrill Hall, Ithaca, N. Y. Information about such rooms may be obtained from the Manager in advance of the application. The list of approved houses will be available after June 1 on application to the Manager, and also, if desired, a supplementary list of private houses with desirable rooms available for mature women who prefer to live outside any of the halls or approved houses. Checks should be drawn to the order of Cornell University.

A deposit of five dollars must accompany each application for a room in any of the three residential halls; otherwise the application will not be entertained. The rooms are reserved in the order of application. If a room assigned is occupied by the applicant, the amount of the deposit is held until the end of the session to cover the return of keys and any damage to building or furniture other than ordinary wear and tear, and to insure the completion of the lease. The deposit will be refunded if the applicant gives formal notice to the Manager on or before June 15 that she wishes to withdraw her application.

FOR MEN

Men attending the Summer Session can obtain comfortable and attractive rooms in the new Residential Halls for Men, which are west of the main quadrangle, conveniently near to the other University buildings. These halls are thoroughly modern and of fireproof construction.

Application for rooms in the Residential Halls for Men, or for plans of the rooms or other information about them, should be made to the Manager of Residential Halls, Morrill Hall, Ithaca, N. Y. Checks should be drawn to the order of Cornell University.

The charge for furnished room, including care of the room and laundry of bed linen, is \$21 for the session. There are a few suites at a higher rate, and some rooms on the top floor may be had for less.

Board may be obtained for an average of \$1 to \$1.50 a day in Willard Straight Hall near the residential halls, or in other dining rooms or restaurants on or near the campus.

A list of private houses offering desirable rooms for rent for the session can be obtained after June 1 by application to the Manager of Residential Halls, Morrill Hall, Ithaca, N. Y.

THE COST OF LIVING

An estimate of the cost of living in Ithaca in the summer can be made by consulting the figures given above. In a private house a student may be able to rent a room at a little less cost for the session than in one of the residential halls. Rooms are rented with the understanding that they will be occupied for the entire session unless both parties agree otherwise. Table board is generally engaged by the week.

MEANS OF SELF-SUPPORT

Students, either men or women, who wish to earn a part of their expenses during the session are invited to correspond in advance with the Manager of Residential Halls, Morrill Hall, Ithaca, N. Y.

THE STUDENT'S HEALTH

MEDICAL ADVICE

The University's staff includes a medical adviser of men and a medical adviser of women, and each of them has a corps of assistants. The medical advisers observe regular office hours, from 10 A. M. till 12 M. daily, at their respective offices in the Gymnasium for men and in Sage College for women. No charge is made for their services.

In cases of illness or indisposition which involve absence from classes even for one day, students are expected to report immediately either in person, by telephone, or by messenger to the medical adviser's office. For the convenience of the adviser such illness should be reported early in the day. Students indisposed but still able to attend classes should consult the medical adviser immediately in order that advice may be given and that diagnosis of incipient diseases may be made promptly. Any student failing to report as soon as possible to the medical adviser any contagious or infectious disease will be regarded as guilty of a serious breach of discipline.

A medical examination is not required of students in the Summer Session, but any student may have such an examination without charge by applying to the medical examiner.

A student may at any time be requested to withdraw from the University if, in the opinion of the University authorities, the condition of his health is such as to make it unwise for him to remain.

THE UNIVERSITY INFIRMARY

The University Infirmary occupies three large buildings near the campus. The first of these, a brownstone structure, was the home of Henry Williams Sage, for many years chairman of the Board of Trustees of the University. After his death in 1897, his sons, Dean and William Henry Sage, endowed it and gave it to the University for a student's infirmary as a memorial of their father. The second building, the Schuyler House, was purchased in 1911; in 1912 the Trustees erected a third building, fireproof, and this is the present main hospital building. The normal capacity of the Infirmary is seventy-five beds; the number can be doubled in an emergency.

The Infirmary, which is in charge of an experienced superintendent and is thoroughly equipped, provides suitable rooms, food, and nursing for sick students. It has no medical staff; students find their own physicians among practitioners in Ithaca or elsewhere.

Students in the Summer Session have all the privileges of admission to the Infirmary. They pay no fee in advance, but are liable to regular charges for services rendered.

THE LIBRARIES

The University Library is open on week days from 8 A. M. till 10:30 P. M. In this building are the main library, containing about 500,000 volumes, and most of the seminary and special libraries. The main reading room affords accommodations for more than two hundred readers, and contains a selected library of about 8,000 volumes of reference works. Below stairs is the periodical room in which are kept the current numbers of about 500 journals in various fields of knowledge. These rooms are open to all students. Students properly qualified are allowed the use of the seminary rooms and the books in them. The main collection is primarily a library of reference for use in the building. Students are, however, to a limited extent, allowed to take out books for home use. Persons wishing this privilege must make a deposit of \$5, which will be refunded upon the return of all books taken out.

The Library of the College of Agriculture, in the basement of Stone Hall, is open on week days from 9 A. M. till 5 P. M., except Saturday, when it is closed at 1 P. M. In it will be found a large collection of bulletins and reports of experiment stations, reference books on agriculture and country life, agricultural periodicals, and the like. The entomological library is one of the most complete of its kind in the United States. Nearly all of the departments in which instruction is given have well-selected departmental libraries.

WILLARD STRAIGHT HALL

All privileges of Willard Straight Hall, the social center of the University, are open to Summer Session students, both men and women, as during the regular college year. In accordance with the regular procedure, a fee of \$2 is required of all summer registrants, payable with the regular tuition fee.

SAGE CHAPEL

Religious services are conducted in Sage Chapel throughout the academic year by clergymen of various religious denominations. There will be services in the Chapel on five Sundays during the Summer Session, July 10 to August 7 inclusive.

LECTURES: MUSICAL RECITALS: EXCURSIONS: CONVENTIONS

In addition to the regular classroom work there will be general public lectures on Monday evenings, and also lectures of general interest each week in connection with the work of various departments. They will be all announced in the Weekly Calendar.

Organ recitals will be given on Tuesday evenings in Sage Chapel and on Sunday evenings in Bailey Hall. A piano lecture-recital will be given each week.

Two concerts by distinguished artists will be given in the course of the session; see the Calendar on page 2. Students can buy tickets for these concerts at reduced rates.

Wednesday evenings are devoted to the departmental conferences, which are open to all interested persons. Notice of these conferences will be given from week to week.

Excursions, in connection with the work of certain departments, are made to many points of interest. Some of them are open to all members of the Summer Session. Especially noteworthy are the excursions to Watkins Glen and to Niagara Falls.

RAILROAD ROUTES TO ITHACA

Ithaca can be reached from New York City by either the Delaware, Lackawanna & Western or the Lehigh Valley Railroad. On both roads there are good trains, with Pullman cars, both night and day. Passengers from the west reach Ithaca by way of the Lehigh Valley Railroad from Buffalo. From stations on the Boston & Albany Railroad, the shortest route to Ithaca is by way of Syracuse and Auburn. By way of the Baltimore and Ohio from Baltimore, Washington, and the south, connections are made at Philadelphia with the Philadelphia and Reading, from which at Bethlehem transfer is made to the Lehigh Valley for Ithaca. From stations on the Erie, connection with Ithaca can be made either by the Lackawanna at Owego or by the Lehigh Valley (Elmira and Cortland branch) at Elmira. Ithaca has connections with the New York Central at Geneva, Auburn, and Canastota.

COURSES OF INSTRUCTION

The word *hour* when used with reference to University credit means the equivalent of one lecture or recitation or two and one-half to three hours of laboratory work a week for a half-year or one semester. In order that this amount of credit may be obtained in six weeks the work done per week must be fully two and one-half times as great. One hundred and twenty such hours are required of candidates for the A. B. degree.

[A limited amount of change in the hours scheduled may be made by the staff at the beginning of the session to avoid conflicts. In the case of morning laboratories the student may obtain permission, at the option of the instructor, to be absent for a period to attend a lecture in some other course. The time so lost is to be made up later.]

COURSES DEALING PRIMARILY WITH PLANTS

S 1. General Botany. Credit six hours. Equivalent to Botany 1. Lectures M T W Th F, 8-9:30. Laboratory, M T W Th F, 9:30-12:30. One personal conference of half an hour each week, at an afternoon hour arranged in consultation with the student. Occasional field trips, including at least one all-day trip. The afternoons should be reserved for these trips and the conferences. *Stone.* Professor PETRY and Mr. BURKHOLDER.

This course is designed to furnish a general knowledge of the fundamental facts and principles of plant life. A careful study is made of form, structure, and reproduction of representatives from the principal groups, with a view to orient the student in the plant kingdom, and to acquaint him with the principal evolutionary tendencies exhibited. Considerable attention is given to life processes, particularly in the higher plants, and to information necessary in the prosecution of more advanced or practical work connected with plants and animals. Laboratory fee, \$5.

S 2. Plant Physiology. Credit four hours. Equivalent to Botany 31. Prerequisite course 1 or its equivalent, chemistry, and permission to register. Lectures, M T W Th F, 12. Laboratory, T W Th F, 9-12. *Stone.* Professor O. F. CURTIS.

This course is designed to acquaint the student with the general principles of plant growth. Topics such as water-relations, photosynthesis, translocation, digestion, respiration, mineral nutrition, and reproduction are studied in some detail and particular emphasis is placed both in laboratory and classroom on discussions of the principles and their application to growing plants. Laboratory fee, \$4.00; deposit, \$2.

S 3. Taxonomy of Vascular Plants. Credit four hours. Prerequisite course 1 or its equivalent. Lectures, M T W Th, 8. Laboratory, M T W Th F, 2-5. Several all-day field trips will be arranged. *Stone.* Assistant Professor MUENSCHER.

A study of the kinds of seed plants and ferns; their classification into genera, families, and orders; and field work on the local flora. Emphasis will be placed on wild plants, but the more common cultivated plants will receive some attention. The course is planned to follow Course 1 and to furnish an introduction to the knowledge of field botany and to the classification of the higher plants in preparation for special work in various departments and as an aid in teaching. Instruction will be given in herbarium methods. Laboratory fee, \$4; deposit \$3.

S 4. Comparative Morphology of Fungi. Credit four hours. Equivalent to Mycology 121. Prerequisite course 1 or its equivalent and permission to register.

Lectures, M T W Th F, 9. *Bailey, West Basement*. Laboratory, fifteen actual hours a week, by arrangement. *Bailey, East Basement*. Professor FITZPATRICK.

An elementary synoptical course designed to acquaint the student with the general field of mycology. Emphasis is placed on morphology and phylogeny, rather than on taxonomy, but abundant opportunity is given for field work. Laboratory fee, \$6; deposit, \$3.

S 5. Plant Anatomy. Credit four hours. Prerequisite course S 1 (Botany 1) or an equivalent and permission to register. Laboratory, M T W Th F, 8-11:30. Hours for lectures and recitations will be arranged during these periods. *Stone*. Professor EAMES.

This course is designed to give a working acquaintance with the internal morphology of vascular plants, and emphasis is placed on practice in interpretation and determination of material. It is planned not only for students desiring training in botany, but also for those in applied fields, such as pathology, pomology, and genetics. Laboratory fee, \$5.

S 10. General Plant Pathology. Credit four hours. Equivalent to Plant Pathology 1. Prerequisite course 1 or its equivalent and permission to register. Lectures, M W F, 7 A. M. Laboratory work; the completion of a minimum of twenty exercises requiring not less than twenty actual hours a week, with personal conferences of half an hour each. Conferences by arrangement. Laboratory at the student's convenience. Assistant Professor WELCH and Mr. SINDEN.

A fundamental course treating of the nature, cause, and control of plant diseases illustrated by studies of the commoner diseases of cultivated crops. Admission limited to twenty students. Laboratory fee, \$4.50; deposit, \$3.

S 19. Special Problems with Plants. Credit two or more hours. Hours to be arranged. In registering for this course the name of the professor with whom the work is to be taken must be stated.

Students who are sufficiently prepared may arrange to engage in the study of some problem or special topic. Such work may lie in the fields of general or taxonomic botany, anatomy, mycology, cytology, plant physiology, plant pathology or genetics. A member of the staff must supervise the work.

COURSES DEALING PRIMARILY WITH ANIMALS

S 20. General Zoology. Credit six hours. Lectures, M T W Th F, 9. *McGraw 5*. Laboratory, M T W Th F, 2-5. *McGraw 2A*. Field studies to be arranged. Professor REED and Assistant Professor YOUNG.

This course is planned to give a comprehensive view of Zoology. To that end will be considered the principles of structure and function, the origin of animal groups, and the application of general biological principles to animal life. The study of animals in their relations as living organisms will be emphasized. Animal types and their classification are employed as a service base from which study may proceed. Laboratory fee, \$3.

[S 21. **Systematic Vertebrate Zoology and Ecology.** Credit four hours. Lectures, Th F, 9 and 12. *McGraw 7*. Laboratory and field work, Th F, 9-12, 2-5, W, 9-1. Some all day trips are required. Occasionally a field trip 5:30 to 8 A. M. or 5-8 P. M. may be substituted for the regular periods. Professor WRIGHT. Not given in 1927.]

S 22. Invertebrate Zoology. Credit four hours. Prerequisite Zoology S 20 or an equivalent and permission to register. Daily, except Saturday, 9-12:30. Field trips, laboratory work, and discussions will be arranged for during these periods. Assistant Professor YOUNG.

This course is planned to give a more intimate acquaintance with the invertebrates, especially the commoner species found in the vicinity of Ithaca. Methods used in collecting and the study of habitats will be the more important objectives of the field trips. Classification, structure, and life cycles will be emphasized in the laboratory. The discussions will be devoted to topics suggested by field and laboratory observations. Laboratory fee, \$3.

S 23. Comparative Anatomy of Vertebrates. Credit four hours. Lecture, daily except Saturday, 8. *McGraw 5*. Laboratory fifteen hours a week at times to be arranged. Professor REED and Mr. SENNING.

A thorough dissection and study of the several systems of organs in a selected series of vertebrate types. The various systems are considered with reference to their significance in progressive modifications and their bearing upon vertebrate descent. The lectures deal with the problems of comparative anatomy. This course is the equivalent of Animal Biology 11 given during the academic year. Laboratory fee, \$6.

S 26. Histology. Credit four hours. The tissues and their histogenesis. No prerequisite, but previous work in biology, zoology and botany, or physiology is recommended. See under course S 27 for time. *Stimson*. Professor KINGSBURY and Mr. ROGERS.

For students of biology or those preparing for medicine. The cell and cellular origin of the body and structure and development of its component tissues. Each student will prepare or receive a series of typical microscopic preparations.

The courses in histology and embryology are given in the histological laboratories in *Stimson Hall*. The department is well equipped for instruction in both subjects, having a large and adequate supply of modern microscopical instruments and an extensive collection of demonstration material for both histology and embryology. Microscopes are furnished by the department. Consultation with the instructors previous to registration is advised. Laboratory fee, \$6.

S 27. Embryology of Vertebrates. Credit four hours. Prerequisite a course in the histology of the tissues or a satisfactory equivalent in other biological work involving training in the use of the microscope. *Stimson*. Professor KINGSBURY and Mr. ROGERS.

For students of biology or those preparing for medicine. Preparation and study of embryological specimens from all the chief groups of vertebrates. Particular emphasis is placed on the embryology of the chick. The student also acquires a knowledge of special methods useful in embryological work. Laboratory fee, \$6.

The laboratory will be open for work in histology and embryology every morning except Saturday. No formal lectures in histology and embryology are scheduled, since it is planned that the work shall be largely individual, with informal discussions from time to time.

S 30. General Entomology. Credit three hours. Equivalent to Animal Biology 3, or Entomology 12. Prerequisite Biology 1 or Zoology 1 or its equivalent. Lectures, M T W Th F, 10. Practical exercises, M W F, 2-5. *Roberts* 392. Professor MATHESON.

This course includes lectures and demonstrations on the characteristics of the orders and families of insects, with a study of their habits, life-histories, and relations to other animals and to plants. The laboratory work consists of the study of the structure, ecology, metamorphosis, and classification of insects. Field trips to study insects in their natural habitats are an important feature. Each student is required to collect and prepare a typical collection of insects. Opportunities are given for the rearing of insects in our insectary, and special work is offered to suit the needs of individual students. Textbook: Comstock's *An Introduction to Entomology*. Equipment: a good hand lens, several insect cases, insect pins, and labels. These can all be purchased in Ithaca. Laboratory fee, \$2.50.

S 31. Elementary Morphology of Insects. Credit three hours. Equivalent to Entomology 21. Twenty-one actual hours a week, by appointment. *Roberts* 391. Professor JOHANNSEN.

This course deals with the external and internal anatomy of several representative insects as the locust, roach, cicada, honeybee, crane fly, etc. Laboratory fee, \$2.

S 32. Elementary Systematic Entomology. Credit two hours. Equivalent to Entomology 31. Prerequisite course S 31. Fifteen actual hours a week, by appointment. *Roberts* 391. Professor JOHANNSEN.

The principles of wing venation and the classification of the orders and families. Laboratory fee, \$2.

Courses S 31 and S 32 are required of all students who plan to take advanced work in Entomology.

S 35. Histology of Insects. Credit two hours. Must be preceded or accompanied by course S 31. Laboratory, fifteen actual hours a week, by appointment. *Roberts 391.* Professor JOHANSEN.

Technique in histological methods as applied to insects. Laboratory fee, \$3.

S 39. Special Problems with Animals. Credit two hours or more. Hours to be arranged. In registering for this course the name of the professor with whom the work is to be taken must be stated.

Students who are sufficiently prepared may arrange to engage in the special study of some problem or special topic. Such work may lie in the fields of general zoology, invertebrate zoology, systematic vertebrate zoology, comparative anatomy of vertebrates, ornithology, histology, embryology, general entomology, systematic entomology, economic entomology, or general biology. A member of the staff must supervise the work.

GENERAL COURSES DEALING WITH BOTH PLANTS AND ANIMALS

S 40. Genetics. Credit four hours. Prerequisite elementary botany and plant physiology, or elementary zoology and animal physiology, and permission to register. Courses in cytology and in taxonomic botany and zoology will be found helpful. Lectures, M T W Th F, 8. Laboratory, M W F, 2-4.30. Conferences to be arranged. *Fernow.* Assistant Professor FRASER.

A general introductory course designed to acquaint the student with the fundamental principles of heredity and variation. Special attention is given to the Mendelian interpretations of the facts of inheritance. Among the topics to be discussed are: the physical basis of heredity; simple cases of Mendelian inheritance; factor interaction; the determination of sex; factor linkage; measurement of variation; quantitative inheritance; pure lines; inbreeding and cross-breeding; cytoplasmic inheritance; and mutation; with suggestions as to the relation of genetical principles to eugenics. Laboratory studies of variation and of the laws of heredity as illustrated by hybrid material in plants and by breeding experiments with the fruit fly, *Drosophila*. Laboratory fee, \$3.

S 6. Cytology. Credit three hours. Prerequisite course S 1 (Botany 1) or course S 20 (Zoology 1) or its equivalent, and permission to register. Laboratory, M T Th F, 9-12:30, usually with a conference at 9. *Stone 207.* Professor SHARP.

This course deals with the subject matter, literature, and problems of cytology. The survey of the field is sufficiently inclusive to make the course of value to advanced students in the various branches of biology, while emphasis on certain features gives it a special significance for the geneticist. The conference hour is devoted to a discussion of topics suggested by the laboratory observations and assigned reading, and, during the latter part of the term, to the review of new literature. Laboratory fee, \$5.

S 42. General Bacteriology. Credit four hours. Prerequisite some work in microscopy. Lectures, T W Th F, 9. Laboratory, T W Th F, 10-1. *Veterinary College.* Professor HAGAN.

A general introductory course in bacteriology covering the distribution, morphology, biology, and methods of study of micro-organisms. The latter half of this course is concerned with the bacteriology of water, sewage, milk and milk products, the fermentation industries, and of some of the more important human and animal diseases. The laboratory work is closely correlated with the subject matter of the lectures. After a number of sessions devoted to the development of technique, there follows work on the bacteria of air, water, milk, fermentation processes, and of disease. Laboratory fee, \$10.

METHODS

Arrangements can be made, contingent upon the time of the instructor, for additional instruction in biological technique. This may include instruction in methods of collecting and preparing laboratory and museum material, the technique of hybridization, etc.

RESEARCH

In addition to the various professors named as directly connected with the Summer School of Biology, other professors who may be in residence during the summer will supervise graduate students engaged in research: Professor HOPKINS, in Plant Physiology; Professors BARRUS, BLODGETT, CHUPP, MASSEY, REDDICK, and THOMAS in Plant Pathology; Professor HERRICK in Entomology; Professor CLAASSEN in Biology; Professor EMBODY in Aquiculture; Professor ALLEN in Ornithology; Professor WRIGHT in Zoology; and Professors BUSSELL, EMERSON, LOVE, and MYERS in Plant Breeding and Genetics.

OTHER COURSES

Besides the courses here included in the Summer School of Biology, the following courses dealing with plants and animals are given in the summer, and may be found described in the Announcement of the Summer Session, a copy of which will be sent on request.

General Biology. Credit three hours. Professor CLAASSEN.

Advanced Biology. Credit three hours. Professor CLAASSEN.

Ornithology. Credit three hours. Professor ALLEN.

Applied Ornithology. Credit two hours. Professor ALLEN.

Trees and Shrubs. Credit two hours. Dr. MANNING.

Garden Flowers. Credit one hour. Miss MINNS.

Garden Flowers. Credit two hours. Miss MINNS.

Indoor Flower Growing. Credit one hour. Miss MINNS.

Woody Plant Materials for Landscape Planting. Credit three hours. Professor CURTIS and Assistant Professor PORTER.

Woody Plant Propagation and Nursery Work. Credit one hour. Assistant Professor HUNN.

Landscape Planting. Credit one hour. Assistant Professor PORTER.

Landscape Planting. Credit two hours. Assistant Professor PORTER.

Forest Trees. Credit one hour. Assistant Professor SPAETH.

Forests and Forestry. Credit two hours. Assistant Professor SPAETH.

Systematic Vegetable Crops. Credit one hour. Professor WORK.

General Bacteriology. Credit two to four hours. Professor SHERMAN.

General Nature Study. Credit two hours. Professor COMSTOCK and Professor PALMER.

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This series of pamphlets is designed to give prospective students and other persons information about Cornell University. No charge is made for the pamphlet unless a price is indicated after its name in the list below. Requests for pamphlets should be addressed to the Secretary of the University at Ithaca. *Money orders should be made payable to CORNELL UNIVERSITY.*

The prospective student should have a copy of the
General Circular of Information

and a copy of one or more of the following Announcements:

Announcement of the College of Arts and Sciences.

Announcement of the College of Engineering.

Announcement of the Law School.

Announcement of the College of Architecture.

Announcement of the New York State College of Agriculture.

Announcement of the Winter Courses in the College of Agriculture.

Announcement of the New York State College of Home Economics.

Announcement of the New York State Veterinary College.

Announcement of the University Division of Education.

Announcement of the Department of Chemistry.

Announcement of the Graduate School.

Announcement of the Summer Session.

Announcement of the Summer Session of the Law School.

Announcement of the Summer School of Biology.

Program of the Annual Farmers' Week.

Annual Report of the President.

Special departmental announcements, a list of prizes, etc.

Other periodicals are these:

The Register, published annually in August, and containing, not announcements of courses, but a comprehensive record of the University's organization and work during the last year. Price, 50 cents.

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The *Announcement of the Medical College* may be obtained by addressing the Cornell University Medical College, Ithaca, New York.

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